



U.S. Department of Energy
Office of River Protection

P.O. Box 450, MSIN H6-60
Richland, Washington 99352

04-ESR-0238

NOV 05 2004

04-WTP-250

Mr. J. P. Henschel, Project Director
Bechtel National, Inc.
2435 Stevens Center
Richland, Washington 99352

Dear Mr. Henschel:

CONTRACT NO. DE-AC27-01RV14136 – APPROVAL OF AUTHORIZATION BASIS
AMENDMENT REQUEST (ABAR) 24590-WTP-SE-ENS-04-097, REVISION 0,
“RECLASSIFICATION OF PRETREATMENT C3 AND C5 VENTILATION AND SAFETY
DESIGN CLASS POWER COMPONENTS TO DOE STANDARD 3009”

Reference: BNI letter from J. P. Henschel to R. J. Schepens, ORP, “Transmittal for
Approval: Authorization Basis Amendment Request 24590-WTP-SE-ENS-04-
097, Revision 0, ‘Reclassification of Pretreatment C3 and C5 Ventilation and
Safety Design Class Power Components to DOE Standard 3009’,” CCN: 094054,
dated September 16, 2004.

This letter approves ABAR 24590-WTP-SE-ENS-04-097, Revision 0, submitted to the
U.S. Department of Energy (DOE), Office of River Protection (ORP) by Bechtel National, Inc.
(BNI) (Reference). The attached Safety Evaluation Report (SER) approves changes involving
the reclassification of C3 and C5 ventilation and Safety Design Class Power Components to
DOE Standard 3009.

ORP’s review of the changes proposed in the subject ABAR and of the changes to the
Preliminary Safety Analysis Report (PSAR), Revision 1, is summarized in the attached SER.
Based upon the information in the Reference letter and the attached SER, the changes are
acceptable with minor modification and there is reasonable assurance that the health and safety
of the public, the workers, and the environment will not be adversely affected by those changes,
and that they comply with applicable laws, regulations, and River Protection Project Waste
Treatment and Immobilization Plant (WTP) contractual requirements.

Some systems have been designated as Additional Protection Class (APC) Structures, Systems
and Components (SSC) in the Reference letter. In discussions with BNI staff, BNI affirmed that
the APC SSC designations for these systems reflect integration of reclassifications due to all
credible accidents.

The attached SER provides final approval for the facility design changes as described in the
ABAR, but only interim approval of the proposed specific changes to the Pretreatment (PT)
PSAR. Final approval of the specific PT PSAR page changes will occur when the revised PSAR
is submitted for the next biennial update. This amendment is effective immediately and shall be
fully implemented within 30 days.

Mr. J. P. Henschel
04-WTP-250

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If you have any questions, please contact me, or your staff may contact Dr. Walter J. Pasciak,
WTP Safety Authorization Basis Team, (509) 373-9189.

Sincerely,


Roy J. Schepens
Manager

WTP:WJP

Attachment

cc w/attach:
M. T. Sautman, DNFSB
J. M. Eller, PAC

**Safety Evaluation Report (SER)
of Proposed Authorization Basis Amendment Request (ABAR)
24590-WTP-SE-ENS-04-097, Revision 0 of changes to the
Preliminary Safety Analysis Report (PSAR); Pretreatment (PT) Facility for the River
Protection Project Waste Treatment and
Immobilization Plant (WTP)**

1.0 INTRODUCTION

This SER documents the U.S. Department of Energy (DOE), Office of River Protection (ORP) evaluation of changes proposed by Bechtel National, Inc. (the Contractor) involving changes to the structures, systems and components' (SSC) classifications in the C3 and C5 Ventilation Systems and the Safety Design Class (SDC) Electrical Power System. These changes are proposed to align these systems with the guidelines in DOE-STD-3009 as represented in the Safety Requirements Document (SRD).

2.0 BACKGROUND

The WTP authorization basis is the composite of information provided by a Contractor in response to radiological, nuclear, and process safety requirements that is the basis on which ORP grants permission to perform regulated activities. The authorization basis includes that information requested by the Contractor for inclusion in the authorization basis and subsequently accepted by ORP. The PSAR describes the analyzed safety basis for those facilities, demonstrates that the facility will perform and be operated such that the radiological, nuclear, and process safety requirements are met, and demonstrates adequate protection of the public, workers, and environment.

The PSAR is based on the preliminary design of the facilities and is part of the authorization basis for WTP construction. ORP authorized construction¹ of the Pretreatment facility based on the facility safety basis documented in the PSAR. Under the requirements of RL/REG-97-13, Revision 10,² the Contractor is required to update the PSAR every two years. This amendment request³ proposes changes to the PT PSAR that will be incorporated in the PSAR during the next biennial update. This SER documents ORP's evaluation of the facility changes proposed in the reference ABAR, and also evaluates the detailed changes to the PSAR.

¹ ORP letter from R. J. Schepens to J. P. Henschel, BNI, "Approval of Preliminary Safety Analysis Report (PSAR) Update, Appendix B, Section 3.3," 03-OSR-0450, dated February 2, 2004.

² "Office of River Protection Position on Contractor-Initiated Changes to the Authorization Basis," RL/REG-97-13, Revision 10, dated December 2003.

³ BNI letter from J. P. Henschel to J. R. Schepens, ORP, "Transmittal for Approval: Authorization Basis Amendment Requests 24590-WTP-SE-ENS-04-097, Revision 0, 'Reclassification of Pretreatment C3 and C5 Ventilation and Safety Design Class Power Components to DOE Standard 3009'," CCN: 094054, dated September 16, 2004.

3.0 EVALUATION (ACCEPTABLE)

Summary of Changes

This Safety Evaluation describes proposed changes to SSC classification in the C3 and C5 Ventilation Systems and the SDC Electrical Power System. The changes are being implemented in order to align them with the guidelines in DOE-STD-3009 as represented in the SRD Appendix A.

SSC within the systems proposed to be reclassified are as follows:

C5 Ventilation Component Classifications		
Component	Current Classification	New Classification
1. C5 Ductwork	SDC/Safety Class (SC)-I	SC/SC-I
2. C5 Fans and Safety Controls	SDC/SC-I	SC/SC-I
3. C5 Stack	Safety Design Significant (SDS)/SC-II	SC/SC-I
4. C5 HEPA Filters	SDC/SC-I	SC/SC-I
5. C5 Fan Room Air Packaged DX Units	SDC/SC-I	SC/SC-I
6. C5 MCC Room Air Packaged DX Units	SDC/SC-I	SC/SC-I
7. C3/C5 Inbleed Fire/Smoke Dampers	SDC/SC-I	SC/SC-I
8. C3/C5 Inbleed Ductwork and Components*	SDC/SC-I	Additional Protection Class (APC)/SC-II
9. C3/C5 Shutdown Interlock	SDC/SC-I	APC/SC-IV

*Upstream of smoke dampers

C3 Ventilation Component Classifications		
Component	Current Classification	New Classification
10. C3 Ductwork and HEPA Filters Housing	SDS/SC-III	APC/SC-IV
11. C3 Fans and Safety Controls	SDS/SC-III	APC/SC-IV
12. C3 HEPA Filters	SDS/SC-III	APC/SC-IV
13. C3 Stack	SDS/SC-II	APC/SC-II

SDC Electrical Power Component Classifications		
Component	Current Classification	New Classification
14. 14.6 kV Switchgear	SDC/SC-I	SC/SC-I
15. 480V Secondary Unit Substations and Transformers	SDC/SC-I	SC/SC-I
16. 480V Motor Control Centers	SDC/SC-I	SC/SC-I
17. Emergency Diesel Generators to 14kV Switchgear	SDC/SC-I	SC/SC-I
18. Uninterruptible Power Supplies	SDC/SC-I	SC/SC-I

Reclassifications from SDC/SC-I to SC/SC-I and from SDS/SC-II to SC/SC-I (Items 1 through 9 and 14 through 18):

In general, the C5 ventilation is classified as SDC because of its use in the mitigation of the consequences of a significant number of design basis events. For almost all events that cannot be prevented through design features, the C5 ventilation system serves as one of the primary mitigation controls protecting co-located workers and the public. Accordingly, the reclassification of most C5 Ventilation components results in a SC rating. The safety function of the SDC electrical power system is to maintain the required power to SDC and SDS loads upon loss of normal power. Since there are a large number of these safety-related systems throughout the PT facility that depend on SDC electrical power to maintain safety function, meet single-failure redundancy requirements, or function in a post seismic environment the entire system will be reclassified from SDC to SC. In addition, changing the SSC designation from SDC to SC is acceptable because SC provides the same level of protection, including the same design criteria, as SDC.

Two components within the C5 Ventilation system are being reclassified from SDC to APC in accordance with DOE-STD-3009. They are the C3/C5 Inbleed Ductwork and Components and the C3/C5 Shutdown Interlock. These items were originally classified as SDC as part of the C5V system as a whole and based on the potential of a ventilation backflow event to impact the facility worker at an SL-1 level. The backflow event was later evaluated in 24590-WTP-ADR-ENS-03-003, Revision 0, Change To HLW C5 Inbleed Design shows that a backflow event can only result in no more than SL-4 to the public and co-located worker and Low consequences (13.3 mrem) to the facility worker. The reclassification was evaluated in ISM meetings and documented in CCN: 089343. In addition, the SIPD database record documents the appropriate severity levels and links to supporting documentation.

Reclassifications from SDC/SC-I, -II, or -III to APC/SC-II, or -IV (Items 10 through 13):

The C3 system is currently classified as SDS for its ability to confine the limited amount of radioactivity potentially generated in the C3 area during normal operations. During normal conditions, negative cell depression and the cascade airflow from the C3 area to the C5 ventilation system provides the needed confinement. Therefore, there are no accident conditions where the C3 system is credited for mitigation of consequences to the co-located worker or to the public. Existing design basis event calculations entries show that there are no postulated spill or other release events in the C3 areas that generate consequences above Severity Level (SL)-4 to the public, SL-3 to the co-located worker or Moderate to the facility worker. All three of these severity levels support selection of the C3 ventilation systems as APC in accordance with Safety Criterion 1.0-6. Accordingly, the C3 Ventilation system is given an APC rating.

3.1 Review of Specific Proposed Changes to PT PSAR

- 3.1.1 Proposed Changes to PT PSAR Table 3A-8A, "PT Additional Protection Class Items", Table 4A-2, "Important to Safety: Description and Basis for Safety Design Significant Structures, Systems and Components" and to Sections 4.3.1.4 and 4.3.2.3:

The following items were added to Table 3A-8A:

SSC	APC Function
4 C3 Ventilation System ductwork and filters	Ensure confinement and filtration of radioactive materials during normal operations
5 C5 Ventilation to C3/C2 Ventilation Exhaust Fans Shutdown Interlock	Upon shutdown of the C5 exhaust fans, an interlock must trip C3 and C2 exhaust fans to minimize backflow into C2 and C3 areas
6 C3 Ventilation stack pipe	Avoid blocking C5 and PJV Ventilation exhaust flows

Item 4 has been moved to this table from Table 4A-2 which contains SDS items. Item 5 is described in the current text of Section 4.3.2.3. It has been deleted there and moved to this location. Item 6 was not specifically called out in the current PSAR.

The Contractor had proposed an Item 7 to this table which addressed the PT Facility stack structural frame. This item is described in the current text of Section 4.3.1.4 as an SDS item. In discussions between ORP reviewers and Contractor staff, it was agreed that the PT Facility stack structural frame should be an SC item so it was moved from the above table to Table 4A-1A. Table 4A-1A presents SC items. Consistent with this change the last bullet of Section 4.3.1.4 is to be modified as follows:

“The facility stack (structural frame) is SC and will meet the requirements of SC-I and PC-3 for other NPH loads. The stack frame will be designed to Meet AISC N690. The Frame is designated as SC (not to block flow) and must meet QL-1 requirements.”

Evaluation (acceptable, as modified): The change is consistent with the proposed design change evaluated in Section 3.0 above. As described in Section 3.0, the C3 system is currently classified as SDS for its ability to confine the limited amount of radioactivity potentially generated in the C3 area during normal operations. During normal conditions, negative cell depression and the cascade airflow from the C3 area to the C5 ventilation system provides the needed confinement. Therefore, there are no accident conditions where the C3 system is credited for mitigation of consequences to the co-located worker or to the public. Existing design basis event calculations entries show that there are no postulated spill or other release events in the C3 areas that generate consequences above SL-4 to the public, SL-3 to the co-located worker or Moderate to the facility worker. All three of these severity levels support selection of the C3 ventilation systems as APC in accordance with Safety Criterion 1.0-6. Accordingly, the C3 Ventilation system is given an APC rating. In discussions with the Contractor, Contractor staff affirmed that the APC SSC designations for these systems reflect integration of reclassifications due to all credible accidents. The facility stack structural frame is designated an SC SSC for compliance with Section 6.0, Appendix A of the SRD. It is designated as Seismic Category-I, Performance Category-3 and designed to AISC N690 as required by SRD Safety Criterion 4.1-3.

Two components within the C5 Ventilation system are being reclassified from SDC to APC in accordance with DOE-STD-3009. They are the C3/C5 Inbleed Ductwork and Components and the C3/C5 Shutdown Interlock. These items were originally classified as SDC as part of the C5V system as a whole and based on the potential of a ventilation backflow event to impact the facility worker at an SL-1 level. The backflow event was later evaluated in 24590-WTP-ADR-

ENS-03-003, Revision 0, Change To HLW C5 Inbleed Design shows that a backflow event can only result in no more than SL-4 to the public and co-located worker and Low consequences (13.3 mrem) to the facility worker. The reclassification was evaluated in ISM meetings and documented in CCN 089343. In addition, the SIPD database record documents the appropriate severity levels and links to supporting documentation.

3.1.2 Proposed Changes to PT PSAR Table 3A-8B, "Seismic Design Requirements for SC-II SSC'S":

The following items were added to this table:

SC-II SSC	Design Requirements/Standards*
C3 Ventilation stack pipe	The stack pipe will be designed to meet ASME B31.3
C3/C5 Inbleed ductwork and components upstream of the smoke dampers	The C3 to C5 in-bleed smoke dampers will be constructed in accordance with ASME AG-I

* APC SSCs that provide II over I protection must meet the Implementing Codes and Standards for NPH design contained in Safety Criterion 4.1-3

ORP reviewers added the footnote to make it clear that APC SSCs that provide II over I protection must meet the Implementing Codes and Standards for NPH design contained in Safety Criterion 4.1-3. There was an item in the above table that provided design requirements for the PT Facility stack structural frame. In discussions between ORP reviewers and Contractor staff, it was agreed to designate the item as SC, and as a result, the design requirements have been deleted from this table.

Evaluation (acceptable, as modified): The above additions to the table are acceptable because they are APC items and the design requirements are consistent with the SRD for SS and SC SSCs. In discussions with the Contractor, Contractor staff affirmed that the APC SSC designations for these systems reflect integration of reclassifications due to all credible accidents.

3.1.3 Proposed Changes to PT PSAR Section 4.4.2, "C3 Area Ventilation System (Filtration)":

This section has been deleted. The C3 Area Ventilation System has been moved to Table 3A-8A under this ABAR.

Evaluation (acceptable): The change is consistent with the proposed design change evaluated in Section 3.0 above. It is appropriate to delete it from Chapter 4 of the PSAR because the C3 system is now designated as an APC SSC as described in Section 3.0 above.

3.1.4 Proposed Changes to PT PSAR Table 4A-1, "Important to Safety: Description and Basis for Safety Design Class Structures, Systems and Components, and Table 4A-1A, "Important to Safety: Description and Basis for Safety Class (SC) Structures, Systems and Components":

The following new table has been added:

Table 4A-1A Important to Safety: Description and Basis for Safety Class (SC) Structures, Systems, and Components

SC System (Major Components)	Credited Safety Function	Representative and Bounding Accident (Chapter 3)	Controls (Chapter 5)
C5 area ventilation system ductwork, stack and stack structural frame 4.3.2	Provide secondary confinement of aerosols and vent path	3.4.1.1, 3.4.1.2, 3.4.1.3, 3.4.1.4, 3.4.1.5, 3.4.1.6, 3.4.1.7, 3.4.1.8, 3.4.1.10, 3.4.2.1	Design feature - C5 area ventilation exhaust system 5.6.2
C5 area ventilation system HEPA filters 4.3.2	Provide filtration of radioactive materials	3.4.1.1, 3.4.1.2, 3.4.1.3, 3.4.1.4, 3.4.1.5, 3.4.1.6, 3.4.1.7, 3.4.1.10, 3.4.2.1	LCO - C5 area ventilation exhaust system operability 5.5.1
C5 area ventilation system fans and safety controls to transfer to standby fan 4.3.2	Provide secondary confinement of aerosols Provide air for cell purge to prevent hydrogen accumulation during large hot/black cell spill Receive vent exhausts from process vessels with passive air in- bleeds for hydrogen mitigation when PVV fan is not operating.	3.4.1.1, 3.4.1.2, 3.4.1.3, 3.4.1.4, 3.4.1.5, 3.4.1.6, 3.4.1.7, 3.4.1.8, 3.4.1.10, 3.4.2.1	LCO - C5 area ventilation exhaust system operability 5.5.1
SC electrical power - switchgear and distribution lines 4.3.10	Provide backup power for SDC/SC components	3.3.5.1, 3.3.5.2, 3.4.1.1, 3.4.1.2, 3.4.1.3, 3.4.1.4, 3.4.1.5, 3.4.1.6, 3.4.1.7, 3.4.1.8, 3.4.1.10, 3.4.2.1	LCO - Safety design class emergency electrical power operability 5.5.14

These four items been moved to this table from Table 4A-1 which contains SDS items. ORP reviewers added "stack structural frame" to the first item in the table.

Evaluation (acceptable, as modified): The change is consistent with the proposed design change evaluated in Section 3.0 above. Change the SSC designation from SDC to SC is acceptable because SC provides the same level of protection, including the same design criteria, as SDC. Designating the stack structural frame as SC ensures that the stack frame will not fail resulting in blockage of the stack.

3.1.5 Proposed Changes to PT PSAR Section 5.5.3, "Limiting Condition for Operation - C3 Area Ventilation Exhaust (C3V) System HEPA Filter Operability":

This section has been deleted.

Evaluation (acceptable): The change is consistent with the proposed design change evaluated in Section 3.0 above. As approved in Section 3.0 and 3.1.3 above, the C3V system has been redesignated as an APC SSC. It is appropriate to delete it from Chapter 5 of the PSAR because Limiting Conditions for Operation do not apply to APC SSCs.

3.1.6 Proposed Changes to PT PSAR Section 5.6.4, "C3 Area Ventilation Exhaust System":

This section has been deleted.

Evaluation (acceptable): The change is consistent with the proposed design change evaluated in Section 3.0 above. As approved in Section 3.0 and 3.1.3 above, the C3V system has been redesignated as an APC SSC. It is appropriate to delete it from Chapter 5 of the PSAR because the design features described in Section 5.6 are for SDC, SS, SC or SS SSCs.

3.1.7 Proposed Editorial Changes to PT PSAR:

There are editorial changes made throughout the PSAR that made the text consistent with the changes evaluated above. These changes appear in the sections indicated in the table below:

Section number	Subject
3.3.5.1.3	Eliminated reference to SDC or SDS
4.3	Added SC to title
4.3.2	Added classification designation
4.3.2.1.4	Added clarification text
4.3.2.3	<ul style="list-style-type: none"> • Indicated C5V SSC designation for workers • Changed SDC to SC • Deleted unnecessary detail regarding C5V components
4.3.2.4.4	Added Editorial clarification
4.3.2.5.2	First paragraph and second sentence of second paragraph, editorial changes for clarity.
4.3.10	Changed SDC to SC in title

In addition, there are many places where SDC was changed to SC. These are as follows: Sections 3.4.1.7.2.6, 3.4.1.8.4.6, 4.3.2.4.1, 4.3.2.5.3, 4.3.2.6, 4.3.4.2, 4.3.4.3, 4.3.4.3.3, 4.3.4.5, 4.3.7.3, 4.3.7.6, 4.3.8.3, 4.3.9.3, 4.3.9.5, 4.3.9.6, 4.3.10.1, 4.3.10.2.1, 4.3.10.2.2, 4.3.10.3, 4.3.10.4, 4.3.10.5, 4.3.10.6, 4.3.14.3.1, 4.3.14.3.2, 4.3.14.6, 4.3.16.3, 4.3.16.6, 4.4.4.3, 4.4.4.6, 4.4.5.3, 4.4.5.6, 4.4.11.3, 4.4.11.5, 4.4.13.3, 4.4.13.6, 5.5.1, 5.5.6, 5.5.7, 5.5.9, 5.5.11, 5.5.12, 5.5.13, 5.5.14, 5.5.15, 5.5.17, and 5.5.19.

Evaluation (acceptable): The changes are acceptable because they are consistent with the proposed design change evaluated in Section 3.0 through 3.1.6 above.

3.1.8 Proposed Changes to PT PSAR Table 5A-1, "Hazard and Accident Analysis and Technical Safety Requirement Cross Reference":

Editorial changes are proposed for this table that involving correcting cross references related to the C3V ventilation system which no longer has LCOs associated with it, and changing SDC to SC.

Evaluation (acceptable): The changes are acceptable because they are consistent with the proposed design change evaluated in Section 3.0 through 3.1.6 above.

3.1.9 Proposed Changes to PT PSAR Section 4.3.2.3, "Functional Requirements":

In the eighth bullet the Contractor proposed the underlined new text:

"The C5V HEPA filters must withstand potential moisture challenges without plugging including minor amounts of highly concentrated caustic aerosol."

Evaluation (withdrawn): Not applicable.

3.1.10 Proposed Changes to PT PSAR Section 4.3.2.4.3, "C5V Exhaust Fans":

In the second bullet the Contractor proposed the underlined new text:

- "C5V exhaust fans will be rated based on tests in accordance with ASME AG-1. The exhaust fans will be able to withstand potential moisture challenges (high humidity) due to process upsets."

Evaluation (withdrawn): Not applicable.

3.1.11 Proposed Changes to PT PSAR Section 4.3.2.5.1, "C5V Ductwork":

The text currently states that C5V ductwork is 316L stainless steel. The Contractor proposed drop the "316L" stainless steel designation.

ORP reviewers and Contractor staff agreed to replace the phrase "C5V ductwork is 316L stainless steel" with "C5V ductwork is 316L or 304L stainless steel".

Evaluation (acceptable, as modified): The modified text is consistent with the requirements of the SRD, Appendix H, for corrosion resistance.

3.1.12 Proposed Changes to PT PSAR Section 4.3.2.5.2, "C5V HEPA Filters":

At the end of the second paragraph the Contractor proposed to modify the text to delete the need for annual aerosol penetration testing and stack emissions monitoring to detect breakthrough.

Evaluation (not acceptable): This level of detail is a safety related requirement. Safety Criterion 4.4-3 states that the design of ventilation and off-gas systems shall permit appropriate periodic inspection and testing. It is appropriate that the PSAR describes the type of inspection and testing that will be conducted pursuant to this safety criterion.

4.0 CONCLUSION

On the basis of the considerations described above, ORP has concluded there is reasonable assurance that the health and safety of the public, the workers and the environment will not be adversely affected by the changes proposed by ABAR 24590-WTP-SE-ENS-04-097, Revision 0. The proposed changes do not constitute a significant reduction in commitment or effectiveness relative to the design, construction, and operation of PT facility important to safety structures, systems, and components. Accordingly, the proposed changes, as modified, are acceptable and ORP approves the proposed PT PSAR changes as proposed in 24590-WTP-SE-ENS-04-097, Revision 0, as modified.